

I claim:

1. A testing apparatus for testing a waste-power ignition coil, the testing apparatus comprising:

a first power source connectable to a primary side of a waste-power ignition coil under test;

5 an ignition simulator comprising an actuator and a switching device having a first state, in which an output of the primary side of a waste-power ignition coil under test is electrically connected to ground to permit current to flow through the primary winding and having a second state, in which the output of the primary side of a waste-power ignition coil under test is electrically disconnected from ground to prevent current flow through the primary side of the  
10 waste-power ignition coil under test;

a distributor comprising a rotor and a rotor cap, the rotor cap comprising a plurality of contacts, a first pair of opposing contacts being electrically connected to a first output of the secondary side of the waste-power ignition coil under test and a second pair of opposing contacts being electrically connected to a second output of the secondary side of the waste-power ignition  
15 coil under test;

a second power source; and

a motor connected to the second power source, the motor having an output shaft configured to rotate the actuator and rotor;

wherein the rotor comprises a point at a distal end thereof disposed to travel adjacent  
20 each of the plurality of distributor rotor cap contacts and to be separated therefrom by a predetermined rotor gap;

wherein the actuator is disposed proximal to the switching device to switch the switching device between the first state and the second state in accord with a rotation of the actuator, and

wherein the rotor acts synchronously with the actuator to ground a respective one of first  
25 output and the second output of the secondary side of the waste-power ignition coil under test to simulate a waste-stroke phase for an associated spark plug and to provide a voltage from another of the first output and the second output of the secondary side of the waste-power ignition coil under test to simulate a power-stroke phase for an associated spark plug.

2. A testing apparatus for testing a waste-power ignition coil in accord with claim 1, the testing apparatus further comprising:

a voltage detection system configured to detect a voltage output from the secondary winding.

3. A testing apparatus for testing a waste-power ignition coil in accord with claim 1, wherein the rotor gap is adjustable.

4. A testing apparatus for testing a waste-power ignition coil in accord with claim 3, wherein the rotor gap is adjustable to obtain an average waste power voltage of between about 2-4 KVp.

5. A testing apparatus for testing a waste-power ignition coil in accord with claim 4, wherein a spark plug gap of each of the first spark plug and second spark plug is set to obtain an average breakdown voltage of between about 6-10 KVp.

6. A testing apparatus for testing a waste-power ignition coil in accord with claim 3, wherein the rotor gap is adjustable to obtain an average waste power voltage of about 3 KVp, and

wherein a spark plug gap of each of the first spark plug and second spark plug are set to  
5 obtain an average breakdown voltage of between about 7 KVp.

7. A testing apparatus for testing a waste-power ignition coil in accord with claim 5,  
wherein the distributor is a four cylinder, external coil type.

8. A testing apparatus for testing a waste-power ignition coil in accord with claim 5,  
wherein the switching device is a FET,  
wherein the igniter simulator comprises an inductor disposed adjacent the igniter  
simulator actuator,

5 wherein the igniter simulator actuator comprises a plurality of magnetic poles that  
produce a flux and induce a current flow within the adjacent inductor to provide a voltage to  
power the FET in accord with a rotation of the motor output shaft.

9. A testing apparatus for testing a waste-power ignition coil in accord with claim 7,  
wherein the first pair of opposing contacts is electrically connected to a negative going  
output of the secondary coil of the waste-power ignition coil under test, and

wherein the second pair of opposing contacts is electrically connected to a positive going  
5 output of the secondary coil of the waste-power ignition coil under test.

10. A testing apparatus for testing a waste-power ignition coil in accord with claim 5,  
wherein the first power source and the second power source consist of a single DC power  
source configured to both power the DC motor and to provide a pre-determined voltage to the  
primary coil of the waste-power ignition coil under test, wherein the voltage supplied to the  
5 primary coil of the waste-power ignition coil under test is maintained within a range of about  
0.15 VDC about the pre-determined voltage.

11. A testing apparatus for testing a waste-power ignition coil, the testing apparatus comprising:

an igniter simulator comprising a first switching device electrically connected to an output of the primary side of a waste-power ignition coil under test and a triggering means for  
5 changing a state of the first switching device at a predetermined interval;

a second switching device bearing a first pair of contacts being electrically connected to one of a positive going and negative going output of a secondary winding of the waste-power ignition coil under test and a second pair of contacts being electrically connected to another of a positive going and negative going output of the secondary winding of the waste-power ignition  
10 coil under test,

wherein the second switching device acts substantially synchronously with the igniter simulator actuator to ground a respective one of the positive going and negative going output of the secondary winding of the waste-power ignition coil under test to simulate a waste-stroke phase.

12. A testing apparatus for testing a waste-power ignition coil in accord with claim 11,

wherein the second switching device is configured to obtain an average waste power voltage of between about 2-4 KVp.

13. A testing apparatus for testing a waste-power ignition coil in accord with claim 12, further comprising:

a first spark plug connected to one of a positive going and negative going output of a secondary winding of the waste-power ignition coil under test; and

5 a second spark plug connected to another of a positive going and negative going output of the secondary winding of the waste-power ignition coil under test;

wherein a spark plug gap of each of the first spark plug and second spark plug is set to obtain an average breakdown voltage of between about 6-10 KVp.

14. A testing apparatus for testing a waste-power ignition coil in accord with claim 12,

wherein the second switching device is adjustable.

15. A testing apparatus for testing a waste-power ignition coil in accord with claim 14,

wherein the second switching device comprises a distributor comprising a rotor and a rotor cap bearing a plurality of contacts.

16. A method for testing a waste-power ignition coil, comprising the steps of:  
electrically connecting an input terminal of a waste-power ignition coil primary coil to a power supply;

electrically connecting a first switching device to an output terminal of the waste-power  
5 ignition coil primary coil;

electrically connecting a negative going output of the waste-power ignition coil to a first spark plug;

electrically connecting a positive going output of the waste-power ignition coil to a second spark plug;

10 electrically connecting a second switching device to each of the positive going output of the waste-power ignition coil and the negative going output of the waste-power ignition coil;

operating the first switching device to intermittently, at a pre-selected interval, connect the output of the waste-power ignition coil primary coil to ground;

operating the second switching device to, substantially simultaneously with the operation  
15 of the first switching device, intermittently and alternately ground the positive going output and the negative going output of the waste-power ignition coil to simulate a waste-stroke phase for the grounded output and associated spark plug and to simulate a power-stroke phase for the non-grounded output.

17. A method for testing a waste-power ignition coil in accord with claim 16, further comprising the step of:

measuring a voltage of at least one of the negative going output and positive going output of the waste-power ignition coil.

18. A method for testing a waste-power ignition coil in accord with claim 17, further comprising the steps of:

measuring a voltage of the negative going output of the waste-power ignition coil; and  
measuring a voltage of the positive going output of the waste-power ignition coil.